A Spectrum Fable: How AESOP and XML Improve Naval Operations

By Jack Gribben

If you remember what it was like to be a preschooler, you'll recall *Aesop's Fables*, short stories with moral lessons passed down from ancient times. However, mention the word "AESOP" around the Naval Sea Systems Command (NAVSEA) these days and a tale of Extensible Markup Language (XML) and the electromagnetic spectrum will emerge. And before the day is through you just might find yourself re-examining the tale of "The Tortoise and the Hare."

The Afloat Electromagnetic Spectrum Operations Program, or AESOP, is a surface Navy spectrum management software tool for managing radar and communications frequencies of shipboard equipment. It is a critical task. Poor spectrum management leads to undue interference that can cripple systems meant to bolster warfighting capabilities like tracking enemy aircraft or jamming enemy radar.

AESOP covers a wide range of situations, from single ship training to large-scale multiple Strike Group operations. In Strike Group operations, the tool's three core components (Communications Planning module, Radar Planning module and Participant module) work in concert to ensure effective spectrum usage. The Communications and Radar Planning modules are used to establish frequency plans for the Strike Group, while the Participant module allows other units to provide inputs in the form of frequency and mode settings for radar and weapons systems.

The current version of AESOP (Version 1.0) is not problem-free. An absence of automation between the Participant and the Radar Planning modules requires large volumes of manual data entry. Ship spectrum data are periodically printed from AESOP and a Sailor must manually key, or "fat-finger," data into the Naval Text Message System. AESOP's fat finger process is an extreme liability in a warfighting environment. It is very time consuming and increases the likelihood of human error.

Enter XML. Last year the Naval Surface Warfare Center Dahlgren Division (NSWCDD), which develops and maintains AESOP, created a new version of the software incorporating XML technology. XML is just right for AESOP because of its unique properties that enable shared vocabularies between systems. The shared vocabularies ensure that authoritative data are visible, available and usable for improved access and accelerated decision making.

Under NAVSEA's direction, NSWCDD introduced the latest AESOP (Version 1.1) using a single XML schema to replace text messages and eliminate the fat finger process required to exchange information between the two modules. NSWCDD tested the new software in October as part of the two-week Trident Warrior 2004 exercises. For TW04, the developers created an XML interface enabling automated generation and parsing of XML-based participant messages as part of a simulation designed to mimic enemy radar jamming.

"Even though it was only experimental, having the ability to test the new version of AESOP during Trident was hugely important," said Mike Mearns, an NSWCDD project engineer. *"As we had hoped, XML was very effective in helping us to achieve greater interoperability through automation and significantly reduced the time needed to transfer and decipher data."*

TW04 was important to AESOP for another reason — it highlighted the growing need for XML reliability standards. During the exercise, the NSWCDD found a great deal of variation in XML components — elements, attributes, types and schema — being used by different developers. Problems arise when multiple XML-based systems can't agree on common components. For example, during Trident Warrior developers used AESOP to communicate with a radio frequency modeling tool called Builder. They were unsuccessful because the two applications were relying on significantly different XML components.

The NSWCDD developers are back at work. This time they have the benefit of the Department of the Navy (DON) XML Naming and Design Rules (NDR) issued in January 2005. The NDR provides a catalog of reusable XML components that facilitate the discovery and use of common data across the DON enterprise. The rules give developers the tools to ensure components are based on open standards that support net-centricity in alignment with the Federal Enterprise Data Reference Model and the Defense Department's Global Information Grid.

"The NDR's support for net-centric operations is helping us to realize the benefits of expanded interoperability," said Bob Green, lead for the DON CIO Data Management Team. *"The rules guide the effective and efficient use, and reuse of XML technologies, and allow us to move beyond the old point-to-point data transfer paradigm. The result is that the Naval warfighter has access to the right data at the right time — and in an understandable format. This will contribute to better decision-making capabilities in both our business and warfighting mission environments."*

Over the next few months, AESOP's XML data elements and schemas will be reformulated from Version 1.1 to Version 2.0 to comply with the NDR. The changes provide a common structure and language for making spectrum assignments and allow a more rapid response to changing requirements. The goal is to have an NDR-compliant AESOP Version 2.0 ready for fleet-wide release by summer 2005. With proper implementation following the NDR framework, XML will enable spectrum managers to truly account for all electromagnetic spectrum-dependent equipment in near-real time.

The moral of this spectrum and XML story: Just as in the fable of the tortoise and the hare, steady progress is what really wins the race.

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